

New Perspectives on the Ecology of Lake Mountain: The Discovery of Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy in Sub-alpine Woodland

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Introduction

Lake Mountain plateau is situated at the western limit of the Australian alps in south-eastern Australia. It is biogeographically important and also has conservation significance at all levels - national, state and regional. This is indicated by the concentration of rare and disjunct populations of species and communities, and the concentration of species and communities, particularly plants, at the geographic and ecological limits of their range (CNR 1994).

Although no comprehensive ecological surveys have occurred at Lake Mountain, recent flora and fauna surveys of the Long Heath-Echo Flat area highlight new ecological information, including the discovery of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy, in sub-alpine woodland. These surveys were completed as part of an assessment of the environmental impacts of two proposed cross-country ski trails at Lake Mountain in December 1993 (CNR 1994).

This paper reports the discovery of Leadbeater's Possum in sub-alpine woodland and results of two subsequent Leadbeater's Possum stagwatch surveys (*sensu* Lindenmayer *et al.* 1989) carried out with The Field Naturalists Club of Victoria.

Further details on methodology, taxonomy and results of the environmental assessment are given in CNR (1994).

Study Area

Lake Mountain (37°31'S 145°53'E) is north-east of Melbourne and 20 km east of Marysville in the Central Highlands of Victoria. High average annual precipitation of around 1400 mm per annum occurs, with frequent snow falls during June to October (Land Conservation Council 1991).

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The study area is 2.5 km north of Lake Mountain summit. It includes approximately 90 hectares of the Long Heath plateau between 1400 m and 1440 m asl, including two tributaries of the Taggerty River, and a small area of approximately 12 hectares at the head of the Royston River catchment between 1420 m to 1450 m asl.

Leadbeater's Possum in Sub-alpine Woodland

Leadbeater's Possum is listed as 'endangered' on Schedule 1 of the 'Endangered Species Protection Act', 1992 and is listed as a threatened taxon on Schedule 2 of the 'Flora and Fauna Guarantee Act', 1988. The species is also classified as 'endangered' by IUCN (1993) and 'endangered' by CNR (1993). Extensive surveys indicate that Leadbeater's Possum is predominantly confined to the montane ash forests in the Central Highlands of Victoria (Lindenmayer *et al.* 1989; Lindenmayer and Dixon 1992; Macfarlane and Seebeck 1991).



Leadbeater's Possum. Note that the white piece hanging down below the branch is bark.

In early December 1993, at 1500 h, three Leadbeater's Possums were disturbed from a one-metre-high hollow in a Snow Gum (White Sallee) *Eucalyptus pauciflora* stump in sub-alpine woodland at the head of the Royston River catchment (Fig. 1). After a short time climbing the nearby Snow Gums and leaping from trunk to trunk, the animals retreated to the original stump and another that was 0.75 m high. Each stump had small hollows at 0.5 m and 0.25 m above the ground respectively. One stump was associated with two other dead coppice stems, the other was associated with two live and three dead coppice stems. The stumps ranged from 20-30 cm diameter and one of the entrances part way up the stump was distinctly chewed (see Lindenmayer 1989).

A subsequent stagwatch in early March 1994, involving 17 observers, recorded five Leadbeater's Possums (two groups of two animals and one individual) spread over part of the same area and all within sub-alpine woodland. One possum group was sighted at dusk, the others were seen after dark. The possums were observed climbing Snow Gums and acacias or moving through the understorey shrubs. No animals were recorded during another stagwatch in late March 1994 with 13 observers in an adjoining area to the west of the Panorama Trail, where one possum was spotlighted during the previous stagwatch.

Habitat Characteristics

In the study area, Leadbeater's Possum was recorded between 1420-1445 m asl on a ridge in the headwaters of the Royston River. A montane ash forest dominated by Alpine Ash *Eucalyptus delegatensis* is situated 350 m to the east of the most north easterly sighting. These sites are separated by a rocky escarpment, wet sub-alpine heathland and sub-alpine woodland.

Multi-stemmed Snow Gums with connecting canopies dominate the sub-alpine woodland which also includes mainly mature, scattered Mountain Hickory Wattle *Acacia obliquinervia* of 5-8 m in height. Average basal area of *A. obliquinervia* in the area is approximately 3.5 m²/ha, although clumps of acacias do occur.



Fig. 1. Snow Gum stump from which three Leadbeater's Possums emerged.

There is abundant evidence throughout the sub-alpine woodland community in the study area that the density of *A. obliquinervia* was high until quite recently, and that most individuals of the currently senescing age class have recently died and most have already collapsed. Therefore, stands with an understorey of *A. obliquinervia* are increasingly uncommon in the sub-alpine woodland community of the Echo Flat-Long Heath area.

Three of the Leadbeater's Possums were sighted near the highest part of the ridge at approximately 1445 m in shrubby sub-alpine woodland. The most elevated and exposed stands of shrubby sub-alpine woodland, on dry flat ridgelines and north-west aspects, are characterised by widely-spaced, broad-crowned *E. pauciflora* and a discontinuous shrub stratum with a distinctive herbaceous flora in the intervening gaps. Shallow soils and occasional outcropping rock account for the gaps in the tree and shrub strata.

These stands of shrubby sub-alpine woodland are significant on account of their rather

restricted occurrence and because their structural and floristic heterogeneity contributes to the highest stand biodiversity recorded for sub-alpine woodland vegetation within the study area. This significant form of shrubby sub-alpine woodland is also at the ecological and altitudinal limit of this vegetation type in the Lake Mountain area (CNR 1994).

The vegetation around the stumps, from which the Leadbeater's Possum emerged, represents a grassy and herbaceous form of sub-alpine woodland in which the understorey is dominated by the grass *Poa ensiformis*, which has an estimated cover of 40%, together with a suite of forbs of which the most common are *Asperula pusilla*, *Hydrocotyle hirta* and *Leptostigma reptans*. Shrubs are scattered and poorly represented. *Eucalyptus pauciflora* forms a continuous and uniform canopy of 15-18 m in height and estimated cover of 35%. The current stems of *E. pauciflora* apparently represent a single age class, mostly multi-stemmed and often including both living stems of canopy height and self-pruned stags or stumps arising from the same lignotuber. These observations are consistent with the interpretation that the stand regenerated prolifically following the 1939 wildfires.

This stand occupies a well-drained mid-slope site of uniform 5% (estimated) slope, NNE aspect and 1425 m elevation asl. Stand diversity is low with only 22 vascular species and ten non-vascular cryptogams (4 mosses, 4 liverworts and 2 lichens) recorded within one quadrat. Four species (*Orites lan-cifolia*, *Ozothamnus secundiflorus*, *Prostanthera cuneata* and *Uncinia flaccida*) are considered regionally significant by Beaglehole (1983) but these are all widespread within sub-alpine woodland at Lake Mountain. No plant species of state or national significance were recorded.

Distribution and ecology

The Atlas of Victorian Wildlife (1994) has several records for Leadbeater's Possum in montane areas around Lake Mountain, including the Lake Mountain summit area. Leadbeater's Possum has previously been recorded approximately 1.8 km to the east at

1180 m in Alpine Ash (D.B. Lindenmayer *pers. comm.*) and 3.2 km to the south at approximately 1420 m, in the Snow Gum/Alpine Ash ecotone (Jenkin and Thomas 1991; D.B. Lindenmayer *pers. comm.*). A sighting of Leadbeater's Possum in sub-alpine woodland on Mount Baw Baw in 1971 is reported in Lindenmayer (1989). However, there are no records of Leadbeater's Possum at Lake Mountain in sub-alpine woodland, distant from *E. delegatensis* or the Snow Gum/Alpine Ash ecotone, that is, outside their potential home range.

The importance of sub-alpine woodland for the conservation of Leadbeater's Possum and the habitat requirements and home range of Leadbeater's Possum in this habitat are not known. As the sub-alpine woodland is under snow for three to four months each year, it is possible that Leadbeater's Possum may use this habitat only on a seasonal basis. Snow Gum stumps and old, dead coppice branches may provide suitable nest sites. Lindenmayer (1991) demonstrated that Leadbeater's Possums use particular trees with hollows over many years, although it is not known whether these hollows are in continuous use. Leadbeater's Possum often change nest trees, some of which are occasionally shared with other arboreal mammals (Lindenmayer *et al.* 1990a).

Leadbeater's Possums nesting in low stumps could be vulnerable to predation and the loss of a connected canopy fragments their habitat, although proximity of tree trunks may be even more important for movement. Loss of these features could increase their susceptibility to predation because they lack a gliding membrane and thus, in areas without a connected canopy or stem proximity, they need to descend into the understorey or to ground-level to move between trees. Thus, considerable care needs to be taken in planning and constructing ski trails which involve changes to the vegetation structure and cover.

The sap from *Acacia obliquinervia* is an important food source for Leadbeater's Possum (Smith 1984; Lindenmayer *et al.* 1994). *Fresh bite marks on several A. obliquinervia* near the potential nest sites of Leadbeater's

Possum indicate that they may be extracting sap from this species.

Snow Gums have abundant loose bark which provides a suitable environment for invertebrates. Arthropods and other invertebrates are an important protein source for Leadbeater's Possum and their abundance may directly influence breeding success (Lindenmayer *et al.* 1990b). Given the low density of acacias and abundance of other insect feeders, invertebrates could be an important food source for Leadbeater's Possum in sub-alpine woodland at Lake Mountain.

The major populations of Leadbeater's Possum occur in the montane ash forests of the Central Highlands. These populations are critical to its future conservation (Lindenmayer and Possingham 1994). However, further study of Leadbeater's Possum in sub-alpine woodland is needed. This may assist with developing long-term conservation strategies using population viability analysis to determine effective reserve systems and management prescriptions for the species (Lindenmayer and Possingham 1994).

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